IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Accompanying Continuation Application Under 37 CFR 1.53(b):

Prior Application:	K. YASUDA et al Serial No. 09/790,872 Filed: February 23, 2001
Group Art Unit:	1655
Examiner:	B. Forman
For:	POLYNUCLEOTIDE SEPARATION METHOD AND APPARATUS THEREFOR

PRELIMINARY AMENDMENT

Commissioner of Patents
Washington, D.C. 20231

Sir:

Prior to examination, please amend the above application as follows.

IN THE SPECIFICIATION

Page 1, before the first line, add the paragraph:

The above-referenced patent application is a continuation application of U.S. Serial No. 09/790,872, filed February 23, 2002, which is a continuation application of U.S. Serial No. 09/666,883, filed on September 20, 2000, which is a continuation of U.S. Serial No. 09/522,465, filed on March 9, 2000 (now U.S. Patent No. 6,218,126), which is a continuation of Serial No. 09/329,318 filed on June 10, 1999 (now U.S. Patent No. 6,093,370), from which priority is claimed under 35 U.S.C. § 120. This application is related to U.S. Serial No.

10/003,305, filed on December 6, 2001, and U.S. Serial No. 10/003,530, filed on December 6, 2001.

Pages 16 and 17, the paragraph bridging these pages from page 16, line 22 to page 17, line 19, replace the paragraph with:

Convergent light 51 is then irradiated through the objective lens 15 to the target polynucleotide hybridization area 142 where the target polynucleotide 42' is hybridized to the probe 42; the photoabsorbing layer 21 in the area 142 absorbs the convergent light 51 and evolves heat. The heat from the photoabsorbing layer 21 in the area 142 allows the vicinity of the area 142 to increase its temperature up to about 95°C, and hence hydrogen bonds between the probe 42 and the target polynucleotide 42' are dissociated to denature the target polynucleotide 42' along which has been hybridized to the area 142. When the size of an area where the convergent light is converged is smaller than that of a unit target polynucleotide hybridization area, the light axis should be adjusted to ensure that the convergent area is within the target polynucleotide hybridization area. When a unit target polynucleotide hybridization area has a smaller size than the convergent area of the convergent light, individual areas should preferably be arranged in such a manner that gaps between individual target polynucleotide hybridization area

are sufficient and only one area is to be heated by the convergent light. In FIG. 3, only one probe is shown in each target polynucleotide hybridization area to be easy to read, but in practice, a plurality of probes having an identical base sequence are generally immobilized to each area.

Pages 18 and 19, the paragraph bridging these pages from page 18, line 14 to page 19, line 2, replace the paragraph with:

FIG. 4 illustrates a second means for heating a specific area on the substrate 1. The photoabsorbable thin layer 21 is formed on the target polynucleotide hybridization areas in the embodiment of FIG. 3, whereas, in the present embodiment, particles 23 each having photoabsorbing characteristics and have sufficiently small sizes in comparison with those of the target polynucleotide hybridization areas are dispersed and placed on the target polynucleotide hybridization areas. At least one particle should be placed on each area. According to the present embodiment, heat insulating layers 22 is separately provided in each of individual areas and the particles 23 are placed onto the upper surface of the insulating layer 22. The substrate 1 comprises substrate base 13 composed of electrically conductive film 131 and thermally conductive insulating substrate 132 as well as in the embodiment illustrated in FIG. 3.

IN THE CLAIMS

Cancel claim 1, and add new claims 30-35 as follows:

30. (New) a cell component recovering apparatus comprising:

a substrate being disposed in a separation cell, wherein the sample solution containing cells is supplied on a surface of the substrate, and a plurality of independent areas are formed on the surface of the substrate;

a first electrode disposed at each of the areas;

a second electrode opposed to the substrate, wherein each of the cells is captured one by one separately on each of the areas, by applying an alternating field between the first electrodes and the second electrode; and

temperature control means for heating the surface of the substrate at one area of the areas to a predetermined temperature to destroy the cell captured at the one area of the areas, to liberate cell components from the cell captured at the one area of the areas into the separation cell;

wherein, by introducing a washing solution into the separation cell, whereby the cells at the areas, except for the one area of the areas, remain on the areas, respectively, the washing solution is recovered to recover the cell components liberated from the cell; and

wherein, by changing a position of the one area of the areas, the washing solution is recovered to recover the cell components liberated from the cell for each of the areas.

31. (New) A cell component recovering apparatus according to claim 30, wherein the cell is a white blood cell.

32. (New) A cell component recovering apparatus comprising:

a substrate being disposed in a separation cell, wherein the sample solution containing cells is supplied on a surface of the substrate, and a plurality of independent areas are formed on the surface of the substrate;

a first electrode disposed at each of the areas;

a second electrode opposed to the substrate, wherein each of the cells is captured one by one separately on each of the areas, by applying an alternating field between the first electrodes and the second electrode;

means for identifying the positions of the areas where the cells each labeled with a fluorescence-labeled substance are present, wherein the fluorescence-labeled substance binds to the cells to selectively label cells by a binding reaction, the fluorescence-labeled substance emit fluorescence upon irradiation with an excitation light, and the positions of the areas are identified by detecting the fluorescence; and

temperature control means for heating the surface of the substrate at one of the identified positions to a predetermined temperature to destroy the cell captured at the area of the one of the identified positions, to liberate cell components from the cell captured at the area of the one of the identified positions into the separation cell;

wherein, by introducing a washing solution into the separation cell, whereby the cells at the areas, except for the area at the one of the identified positions, remain on the areas, respectively, the washing solution is recovered to recover the cell components liberated from the cell; and

wherein, by changing a position of the identified positions, the washing solution is recovered to recover the cell components liberated from the cell for each of the identified positions.

33. (New) A cell component recovering apparatus according to claim 32, wherein the cell is a white blood cell.

34. (New) A cell component recovering apparatus comprising:

a substrate being disposed in a separation cell, wherein the sample solution containing cells is supplied on a surface of the substrate, and a plurality of independent areas are formed on the surface of the substrate;

a first electrode disposed at each of the areas;

a second electrode opposed to the substrate, wherein each of the cells is captured one by one separately on each of the areas, by applying an alternating field between the first electrodes and the second electrode;

means for identifying the positions of the areas where the cells labeled with the fluorescence-labeled antigen substance are present, wherein the fluorescence-labeled antigen substance is introduced into the separation cell to label the cells which make an antibody response to the antigen substance, the fluorescence-labeled antigen substance emit fluorescence upon irradiation with an excitation light, and the positions of the areas are identified by detecting the fluorescence; and

temperature control means for heating the surface of the substrate at one of the identified positions to a predetermined temperature to destroy the cell captured at the area of the one of the identified positions, to liberate cell components from the cell captured at the area of the one of the identified positions into the separation cell;

wherein, by introducing a washing solution into the separation cell, whereby the cells at the areas, except for the area at the one of the identified positions, remain on the areas, respectively, the washing solution is recovered to recover the cell components liberated from the cell; and

wherein, by changing a position of the identified positions, the washing solution is recovered to recover the cell components liberated from the cell for each of the identified positions.

35. (New) A cell component recovering apparatus according to claim 34, wherein the cell is a white blood cell.

REMARKS

Claims 30-35 are now pending.

Respectfully submitted,

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MARKED UP COPY OF THE SPECIFICATION

Pages 16 and 17, the paragraph bridging these pages from page 16, line 22 to page 17, line 19, the marked up paragraph is as follows:

[Divergent] Convergent light 51 is then irradiated through the objective lens 15 to the target polynucleotide hybridization area 142 where the target polynucleotide 42' is hybridized to the probe 42; the photoabsorbing layer 21 in the area 142 absorbs the convergent light 51 and evolves heat. The heat from the photoabsorbing layer 21 in the area 142 allows the vicinity of the area 142 to increase its temperature up to about 95°C, and hence hydrogen bonds between the probe 42 and the target polynucleotide 42' are dissociated to denature the target polynucleotide 42' along which has been hybridized to the area 142. When the size of an area where the convergent light is converged is smaller than that of a unit target polynucleotide hybridization area, the light axis should be adjusted to ensure that the convergent area is within the target polynucleotide hybridization area. When a unit target polynucleotide hybridization area has a smaller size than the [divergent] convergent area of the [divergent] convergent light, individual areas should preferably be arranged in such a manner that gaps between individual target

polynucleotide hybridization area are sufficient and only one area is to be heated by the convergent light. In FIG. 3, only one probe is shown in each target polynucleotide hybridization area to be easy to read, but in practice, a plurality of probes having an identical base sequence are generally immobilized to each area.

Pages 18 and 19, the paragraph bridging these pages from page 18, line 14 to page 19, line 2, the marked up paragraph is as follows:

FIG. 4 illustrates a second means for heating a specific area on the substrate 1. The [photoabsorvable] photoabsorbable thin layer 21 is formed on the target polynucleotide hybridization areas in the embodiment of FIG. 3, whereas, in the present embodiment, particles 23 each having photoabsorbing characteristics and have sufficiently small sizes in comparison with those of the target polynucleotide hybridization areas are dispersed and placed on the target polynucleotide hybridization areas. At least one particle should be placed on each area. According to the present embodiment, heat insulating layers 22 is separately provided in each of individual areas and the particles 23 are placed onto the upper surface of the insulating layer 22. The

substrate 1 comprises substrate base 13 composed of electrically conductive film 131 and thermally conductive insulating substrate 132 as well as in the embodiment illustrated in FIG. 3.